

Serious scale-up

Rely on

 ROHNER | CHEM

**Your complete
solution
provider**

▶ Chemical Development ▶ Kilolab ▶ Pilot Plant ▶ Flawless Upscaling/Full-Scale Manufacturing



Serious scale-up

Rely on
• ROHNER | CHEM

• ROHNER | CHEM

RohnerChem Key Facts

- Headquarters and production located in Pratteln, Switzerland
- Founded in 1906 by Joseph Rohner
- Excellent regulatory track record, last FDA inspection in August 2011 (no 483`s)
- Two multipurpose plants with 145 m³ total primary reactor volume
- Strong upscaling capabilities (kilo lab, pilot plant with three pilot trains up to 1 m³ reactors)
- Invested 200 Mio. CHF in the site in the last decade including cryogenic and high-pressure technologies
- Demonstrated relationship with a number of major pharma companies on a global basis
- 200 employees, significant growth in 2010 and 2011
- Excellent quality system and regulatory track record (ISO 9001 / 14001, FDA inspected)



Serious scale-up

Rely on
• ROHNER | CHEM

• ROHNER | CHEM

Our Service Offering

- Excellent track record in complex scale-ups and delivering rapid commercial supply
- Customer focused project management with clear lines of communication
- Proven change management process and rapid resolution of problems and issues
- Right first time and continuous improvement culture
- Competitive solutions with the responsiveness and reliability of European supply
- Full service offering from development through to commercial supply



Serious scale-up

Rely on
• ROHNER | CHEM

• ROHNER | CHEM

Our Core Technologies

- Transition metal catalysis
- High-pressure hydrogenations and carbonylations
- Organometallic and cryogenic chemistry
- Hazardous and malodorous reagents
- Hydrazine chemistry and heterocycles

Serious scale-up

Rely on
ROHNER|CHEM

ROHNER|CHEM

►Route Identification ►Chemical Development ► Kilolab ► Pilot Plant ► Flawless Upscaling/Full-Scale Manufacturing

Solvias and RohnerChem – A Powerful Combination of Resources, Expertise and Technology

- Reduced time to commercialization
- HTS for fast and cost-effective development (Solvias)
- Consideration of upscaling requirements from early phases onwards
- One overall project manager (Solvias or RohnerChem)
- Non-GMP and GMP manufacturing

Catalysis and Ligands

- C,X Couplings
- Carbonylations
- Hydrogenations
- Hydroformylations
- > 600 ligands and catalysts to choose from
- HTS (high-throughput screening)

Biocatalysis

- Large enzyme library
- ADH, esterases
- HTS

Hazardous Chemistry

- Carbonylation (CO)
- H₂S and thiols
- Cyanides
- H₂ (High pressure)
- Hydrazine chemistry
- Fluorination chemistry
- HTS

Polymorphism, Salts & Crystallization

- An integrated approach to solid-state development
- Racemate resolutions
- Polymorph identification and process development

- HTS



Serious scale-up

Rely on
ROHNER|CHEM

ROHNER|CHEM

API Case Study

Example: API for the US, European and Japanese Market

11 step synthesis with the need to control several stereocenters

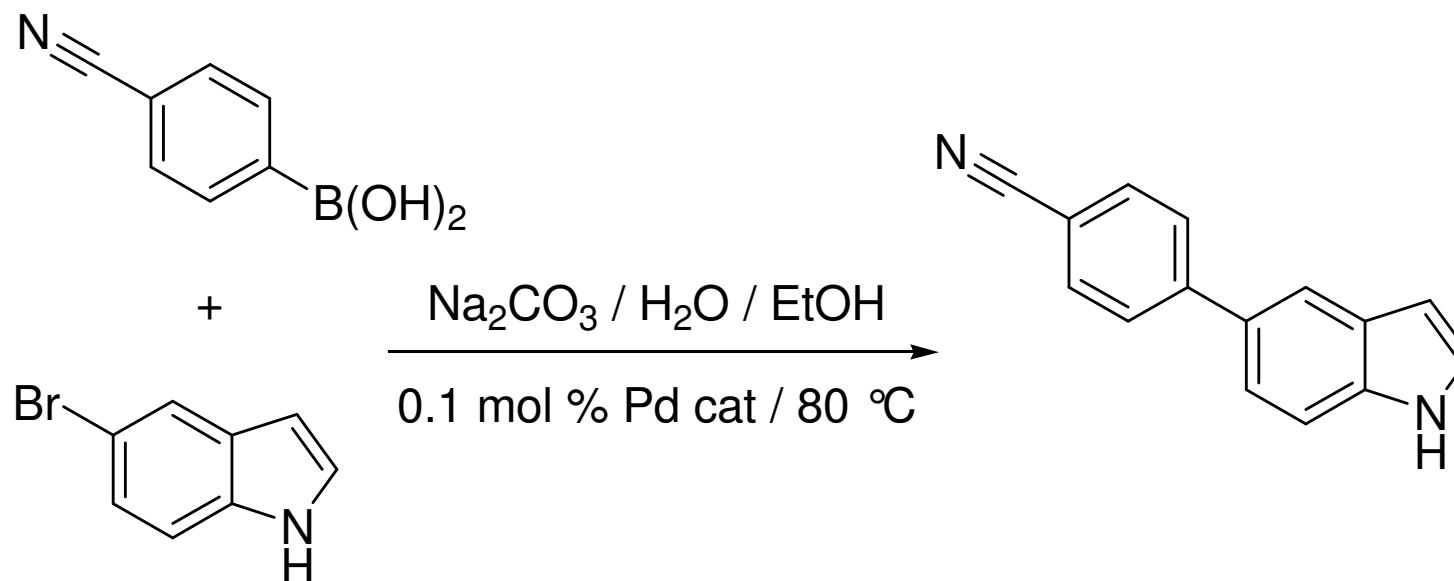
- Carbohydrate and Heterocyclic Chemistry including high pressure catalytic hydrogenation (50 bar)
- Largest scale done before: 10 kg
- Production / Validation on 1'000 kg scale in 11 months from scratch with no technical batch on production scale
- Demonstrated cost reductions over time

Serious scale-up

Rely on
 ROHNER|CHEM

ROHNER|CHEM

Technologies (1): Transition-metal chemistry and cryogenic reactions

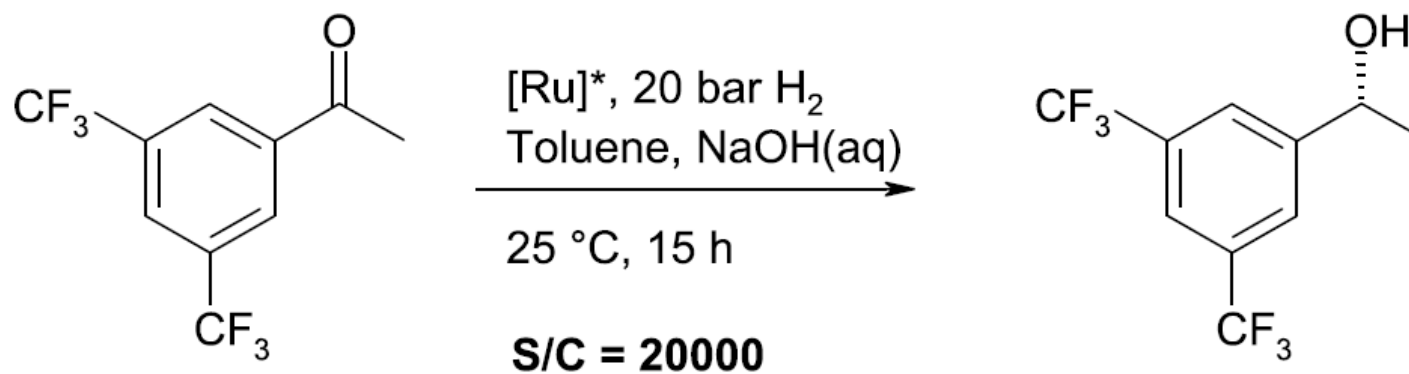


Serious scale-up

Rely on
ROHNER|CHEM

ROHNER|CHEM

Technologies (2): High-Pressure Hydrogenations

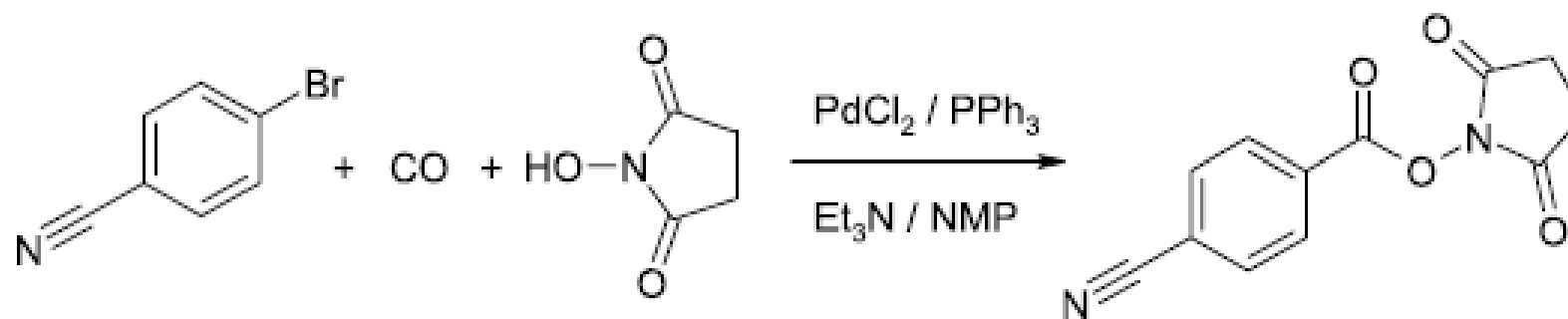


Serious scale-up

Rely on
ROHNER|CHEM

ROHNER|CHEM

Technologies (3): Carbonylations

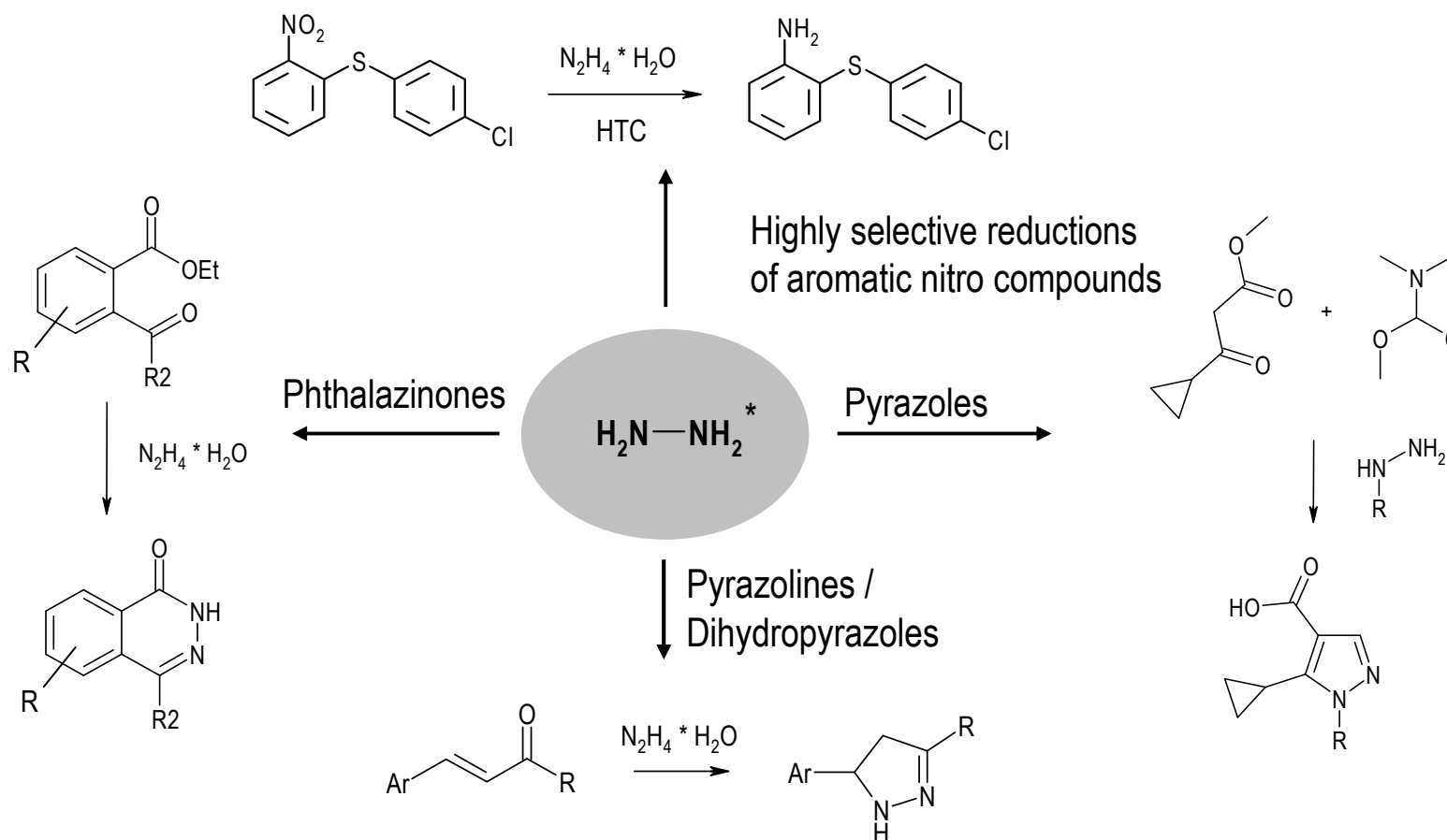


Serious scale-up

Rely on
ROHNER|CHEM

ROHNER|CHEM

Technologies (4): Hydrazine Chemistry

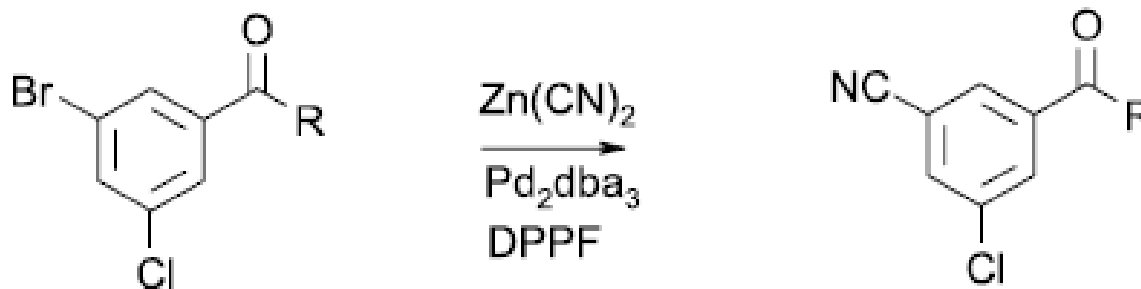


Serious scale-up

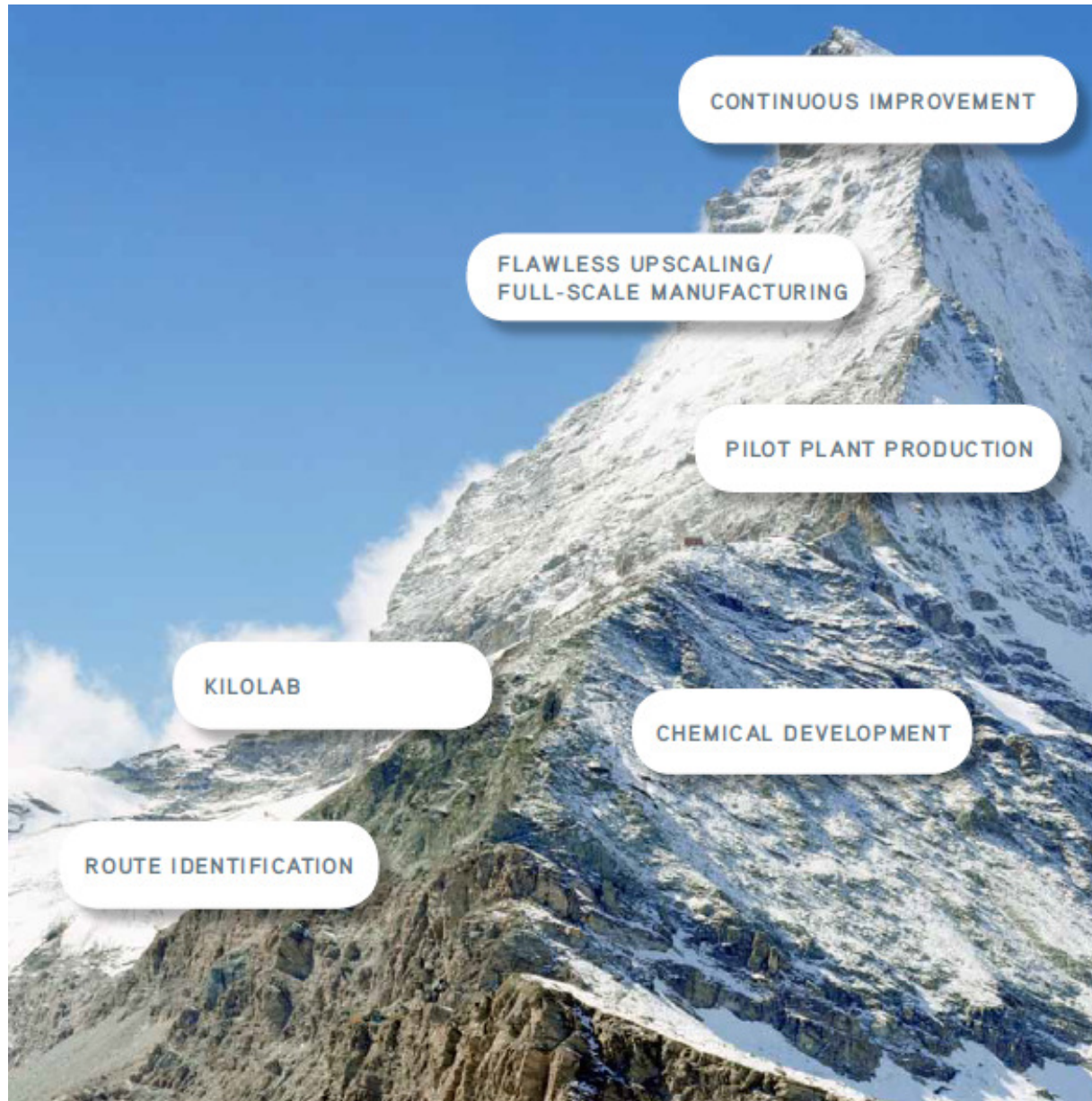
Rely on
ROHNER|CHEM

ROHNER|CHEM

Technologies (5): Cyanide Chemistry



Our Value Proposition



Serious scale-up

Rely on

ROHNER|CHEM

ROHNER|CHEM

Overview – Key Technologies and Services

Rapid Process Development, Flawless Upscaling, and Economy of Scale-Production

Strong R&D /Process Development and Project Management Team and in-house Process Safety Group. Swiss Precision in Upscaling. Availability of up to 10,000 L Reactors. Waste Water Treatment Plant, Offgas Treatment by Catalytic Oxidation and Biofilter Systems. Cryogenic and High-Pressure Equipment.

Solids Handling

Broad range of special Isolation, Handling and Drying Large-scale Equipment for Solids in Hastelloy and Stainless Steel: Inverting filter Centrifuges, stirred Pressure filters, Filter press, Vacuum paddle dryers, Nutche filter dryers, Fluidized bed dryer, Spin flash dryer, Spray dryer, Vacuum tray dryers, Air jet mill.

Functional Polymers

Polycondensations, Polymer Modifications, Radical and Controlled Radical Polymerisations (Atom-Transfer Radical Polymerisations, ATRP) for High-Performance Polymers for Lithography, Coatings, Electronics and Medical Applications. Coating technologies.

API Manufacturing

Development, Upscaling and Production of API in FDA-inspected cGMP equipment. ISO 9001 / 14001 Certification. SwissMedic Approval. Five Clean Rooms class 100'000.

Organometallic and Cryogenic Chemistry

Grignards, Organolithium chemistry, Boronic acids, Organozinc chemistry, other Low-temperature reactions down to - 80 °C.

Transition-Metal Catalysis

Homogeneous and heterogeneous Transition-Metal Catalysis. Special methods for Reduction of Platinum metal contents below 10 ppm levels. Suzuki-, Heck-, Kumada-, C,N- and other Couplings.

High-pressure Hydrogenations and Carbonylations

Hydrogenations and Carbonylations at up to 64 bar. Very high pH Flexibility due to Inconel hydrogenation Equipment. Asymmetric hydrogenations.

Hydrazine Chemistry and Heterocycles

Decades of Experience in various Applications of Hydrazine hydrate in the synthesis of Heterocycles and in a special Nitro group reduction technology. Production of numerous five- and six-ring Heterocycles - Examples: Pyridines, Quinazolines, Quindines, Indoles, Oxindoles, Thiazoles, Pyrazoles, Pyrazolones, Pyrimidines, ...

Hazardous and Malodorous Reagents and Reactions

Nitrations, Cyanuric chloride, Dimethylsulfate, Diethylsulfate, Epichlorohydrine, Cyanide, Alkylolithiums, Hydrogen peroxide, Alkylmercaptans, Nitromethane, Bromine, ...

